

DIVISION OF TRAUMA SURGICAL CRITICAL CARE

DIAGNOSIS AND TREATMENT OF VENTILATOR ASSOCIATED PNEUMONIA

INTRODUCTION

Ventilator Associated Pneumonia is a nosocomial pneumonia that develops after 48 hours of mechanical ventilation occurring in approximately one fourth of ICU patients. Mechanical ventilation is the strongest risk factor for developing nosocomial pneumonia. Other risk factors include:

- Age > 70 years
- Chronic lung disease
- Depressed LOC
- ICP monitors
- Nasogastric tubes
- Chest surgery / trauma
- H-2 blocker/ antacid therapy
- Frequent changes in ventilator circuit
- Transport from the ICU for procedures

Diagnosis:

- A. New, persistent, or progressive infiltrate
- B. Respiratory
 - a. Purulent secretions
 - b. Decline in pulmonary status
 - i. Worsening hypoxemia
 - ii. Reduced tidal volume
 - iii. Increased inspiratory pressures
- C. Inflammatory
 - a. Fever (>38.5° C)
 - b. Leukocytosis
 - c. New onset delirium

THE FOLLOWING ALGORITHM WILL BE USED IN SUSPECTED VAP:

1. If presence “A” plus two additional symptoms under above diagnosis findings above, perform bronchoscopy with quantitative BAL from each lower lobe.
2. Initiate empiric antibiotic therapy AFTER diagnostic bronchoscopy. Please refer to quarterly antibiotic rotation.
3. Adjust antibiotic therapy based on quantitative BAL results.
4. Cultures with > 10⁴ CFU/mL of bacteria are considered positive and should be treated for 7 days.
5. Discontinue antibiotics if bacterial counts are < 10⁴ CFU/mL.

Performance of BAL:

Patients suspected of VAP should undergo **bronchoscopy** and collection of quantitative **BAL**.

1. Advance bronchoscope into segment in question as directed by the chest x-ray with tip of the scope wedged into the bronchus. If patient can tolerate procedure, perform diagnostic BAL on other side as well.
2. Instill sterile non-bacteriostatic saline. The first instillation should be used to “wash” and then suctioned/discarded to limit contamination of sample.
3. Instill additional sterile non-bacteriostatic saline and collect in sputum trap.
4. Label and send pooled contents immediately to microbiological laboratory for quantitative culture.

Tracheal aspirate should be obtained only when patients who meet the qualifying criteria are too unstable to undergo bronchoscopy and BAL. If clinical suspicion high and patient too unstable for bronchoscopy, obtain tracheal aspirate and begin empiric antibiotic therapy. Refer to above algorithm regarding de-escalation of antibiotic therapy.

References

Kalil AC, Meterski ML, Klompas M, et al. Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society. *Clin Infect Dis*. 2016 Sep 1;63(5):e61-e111

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